

# SCIENCE

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## THE HALPINE TORPEDO-BOAT.

THE object in this invention is to provide a small vessel, if we may call it such, that can be steered electrically from the shore or from a war-vessel, and capable of carrying a torpedo that shall be thrown out on the boats touching any obstruction, such as a ship's side, and then discharged; the boat, however, first automatically backing away from the torpedo, so as to be at a safe distance when the explosion takes place.

The necessity for doing this by some small contrivance is that it

vented years ago. In this torpedo, motive and steering apparatus were provided, to be operated in various ways, but in the end to be controlled electrically from the starting station, whether on shore or shipboard. Some torpedoes of this design worked fairly well, but the explosion involved the destruction of apparatus costing thousands of dollars, so that practical experiments were few.

The Halpine torpedo-boat is a fish torpedo, which, after leaving its torpedo in any desired position, remains a fish, and runs away, so that when the explosion occurs it may be at a safe distance.

This plan is credited to Lieut. Nicholas J. Halpine of the United



## THE HALPINE-SAVAGE TOPEDO-BOAT.

may be as inconspicuous as possible, and that it may furnish a small target for an enemy's guns. This last point is not of so much importance, however, since the modern machine-guns can pepper the surface of the water with shot to such an extent that no torpedo craft is likely to escape destruction if seen. These very machine-guns make the use of the so-called torpedo-boats extremely hazardous, and, some would have us believe, entirely unserviceable. Even at night the search-lights would detect their approach, when the guns would make quick work of them.

To avoid this difficulty of approach, the fish torpedo was in-

States Navy. But just as the plans of the lieutenant were about to materialize, he received orders to join the "Tallapoosa" in South American waters. It thus happened that the further carrying-out of the scheme devolved on Mr. Arthur W. Savage, the inventor of improved small arms. In some of the electrical work Mr. Savage was assisted by Mr. Frank A. Perret of Brooklyn, to whom we had occasion to refer not long since as the inventor of the Perret motor.

Our illustration shows the boat on shore. In the cigar-shaped hull are contained storage-batteries capable of driving the electric

motor attached to the propeller-shaft. A case containing the high explosive is carried in a chamber in the forward end. This chamber slopes downward, so that the torpedo, which has a rocket attachment at its rear end, will be thrown down and out on being released. It is also proposed to invert the boat when occasion may require, and provide means for throwing the torpedo from this chamber into the air, so that it may fall on a vessel's deck.

The position of the opening to this torpedo-chamber may be seen in the illustration, as the small chain connecting with the harpoon in front is attached to the torpedo. When the harpoon strikes a wooden bottom, it is expected to penetrate deeply enough to hold. When it passes through a torpedo-net, the harpoon-head will pass through the meshes till the cross-arms are reached, when a spring catch is released allowing other cross-arms to open inside the net, and nearer the harpoon-head. In any event, the harpoon is held. At the same time the torpedo is released, the rocket chamber in its rear end is ignited, and the torpedo discharged downward. The chain attachment to the harpoon-head then compels a swinging motion, so as to bring the torpedo up against the vessel's bottom.

While all this is going on, the automatic arrangements have reversed the boat, and carried it away from its dangerous position, so that the operator may then guide it safely back for use in another attack.

#### AMERICAN PUBLIC HEALTH ASSOCIATION.

On the second day, Wednesday, Oct. 23, Dr. John S. Billings of the United States Army read a paper on "The United States Census in its Relation to Sanitation." He emphasized the importance of the collection of vital statistics. Many do not regard this as so important as other work in behalf of public health. In order to convince the press and the community that the work of a board of health is necessary, you must produce constant, undeniable evidence; and this evidence must be mainly death-rates, to which should be added all the sickness-rates obtainable. To do this there must be a complete registration of deaths and births, and an enumeration of the whole population. Before this association meets again, the eleventh United States census will have been taken, and its methods and results are of great interest to all sanitarians. One of the most important questions to be settled before the census is taken is, "What shall be the boundaries of the special districts of the city for which a separate statement of the population is desired?" In some cities the wards form fairly satisfactory districts for the purpose, and where this is the case it makes the problem very easy. But in many cities these divisions bear no proper relation to different sanitary conditions: therefore in about a dozen of our large cities it is proposed to make a systematic division of the area into sanitary districts having special relations to altitude, character of habitations or of population, etc., and to have special death-rates calculated for each of these districts. This is being done in conference with the health authorities of these cities, and it is hoped that in this way some very interesting data will be obtained which will serve as a foundation for sanitary work in the future.

To make the statistics as correct and useful as possible, all deaths occurring in hospitals should be charged to the ward or district of the city from which the patient was taken to hospital, when this can be ascertained; otherwise the death-rate in the ward in which the hospital is located will be too high, and in the other districts it will be too low. The birthplace of the parents of the decedent should be also reported. Moreover, it is very desirable that in all cases of deaths of colored persons it should be stated whether the decedent was black or of mixed blood, such as mulatto or quadroon. One of the most important questions in the vital and social statistics of this country relates to the fertility, longevity, and liability to certain diseases, of those partly of negro and partly of white blood; and the only way to obtain data on this subject is through the registration of vital statistics. For all cities of ten thousand inhabitants and upward, it is proposed to collect as complete information as possible with regard to altitude, climate, water-supply, density of population, sewerage, proportion of sewered and non-sewered areas, and other points bearing on the healthfulness

of the place which will permit of interesting comparisons with the death-rates. The cordial co-operation of all physicians and sanitarians is solicited in making the data of these reports accurate and complete. It is desired to make these vital statistics an unanswerable argument in favor of systematic public sanitary work and of the granting of State and municipal funds necessary for maintaining such work.

In a paper by Dr. Ezra M. Hunt, secretary of the State Board of Health, Trenton, N.J., on "The Prevention of Phthisis Pulmonalis, and Methods for its Limitation," the author criticised those who regard the infection of phthisis pulmonalis as exclusively due to inhalation of the dried sputa of this disease. The theory was advocated that the breath of a consumptive patient is capable of carrying the contagion.

Dr. W. M. Smith, quarantine officer of the port of New York, read a paper on "Improvements at the New York Quarantine Station."

An excursion to the Quarantine and East River Hospitals, accompanied by Dr. Smith, took up most of the day.

At an evening session, Dr. George M. Sternberg, U.S.A., gave an account of recent researches relating to the etiology of yellow-fever. The investigations were made in Havana, between the middle of March and the first of September, 1889. Ample material has been obtained for a thorough research by modern culture methods. Thirty autopsies have been made in typical cases of yellow-fever. The cultures obtained require further study and extended comparative research before any definite conclusion can be reached as to the specific etiological relation of one or other of the micro-organisms found in yellow-fever cadavers, principally in the intestine. One method followed in the entire series of cases was the preservation of a piece of liver or kidney in an antiseptic wrapping, by which the exterior was sterilized and the entrance of germs from without prevented. Such a piece, after forty-eight hours in the laboratory, appeared fresh, and had no odor, but when cut was found to contain various micro-organisms. The cut surface had an acid re-action. The bacilli were of various species, and corresponding with those found in the contents of the intestine. No satisfactory evidence has been obtained, up to the present time, that any one of these is the veritable yellow-fever germ. One of the most constantly found of these micro-organisms was a large motionless, anaerobic bacillus, resembling that of malignant œdema. This, and others found in a less number of cases, were present in small numbers at death, and in a large proportion of cases the result of an examination made immediately from fresh liver-tissue was negative. Material from a piece of liver, kept as above, and containing micro-organisms, is very pathogenic for guinea-pigs when injected subcutaneously in small quantities, while the fresh tissue may be injected in considerable amount without noticeable effect. The micrococcus of Freire has not been found in any cultures of this series, and the bacilli of Finlay and Gibier have not generally been found in the tissues of yellow-fever cadavers.

Dr. Theobald Smith of Washington read some preliminary observations on the micro-organism of Texas fever. Cultures have been made from the spleens of animals who died of Texas fever, and a variety of bacteria found. A variety of experiments led to the discovery of an organism within the red blood-corpuscles. The intraglobular bodies found are round or oval, and nearly colorless. There is usually one, but two or more may be found in one corpuscle.

This was followed by a paper by D. E. Salmon, D.V.M., chief of the Bureau of Animal Industry, Washington, entitled "Some General Observations on Texas Fever." The resemblance in the characteristics of yellow-fever in man and Texas fever in cattle was noticed. Each disease has a permanently infected and well-known district which is its home. The contagion of both diseases is carried, not by the sick, but by the healthy. Natives in the infected districts have a certain immunity from disease, while non-residents entering the locality will contract the fever. Both diseases, when carried north of their home, require a period of warm weather for development. Neither contagion survives a winter of snow and frost beyond its home. Both diseases are accompanied by an inflammation of the liver which causes yellow discoloration of the tissues, and in both hæmaturia is seen. These points of

similarity may indicate that the germs have a similar nature, but the facts are given as a coincidence.

Edward Atkinson, LL.D., of Boston, Mass., read a paper on "The Art of Cooking." A form of oven heated by an oil-lamp, with great saving of heat and fuel, was shown, and food prepared before the audience.

For the reports of this day we are indebted to *The Medical Record*.

The first paper on Thursday, Oct. 24, was by Health Commissioner Martin of Milwaukee, upon the disposal of garbage in that city. He considered various methods of getting rid of the refuse of cities. Many forms of crematories were in the market for burning garbage, but none worked with absolute satisfaction, and some were intolerable nuisances. Dr. Martin claimed that the cremation of garbage had had its day. He strongly favored the Merz system, which has been in use in Milwaukee since June last. From June 11 last, the quantity of garbage collected is forty tons daily, which, with that brought to the works by the commission dealers, wholesale men, and grocers, brings the total up to fifty tons, which is promptly disposed of. The works are situated in the slaughter-house district, and the building is a two-story frame, 62 by 110 feet. The garbage-teams drive up an inclined roadway to the second story, where the garbage is thrown on the floor to be scraped into the driers, of which there are eight. The time occupied in drying the garbage varies, of course, with the quantity and amount of moisture, but is usually from eight to eleven hours.

Dr. S. S. Kilvington, health commissioner of Minneapolis, presented a paper upon "Statistics on River-Pollution, with Observations Relating to the Destruction of Garbage and Refuse Matter." He said, that, out of thirty-five health officials he had communicated with, twenty-three favored the cremation system. He also said that in the Mississippi River, during the past year, eight cities alone deposited 152,675 tons of garbage and offal, 108,250 tons of night-soil, and 3,765 dead animals. In the Ohio River five cities in the same period dumped 46,700 tons of garbage, 21,157 tons of night-soil, and 5,100 dead animals. In the Missouri River, four cities cast 36,000 tons of garbage, 22,400 tons of night-soil, and 31,600 dead animals. No theory of self-purification of running water will dwarf the magnitude of this sanitary crime. The speaker doubted the practicability of using garbage as a fertilizer, because, while it contained fertilizing elements, they were not sufficiently concentrated for agricultural use. The trouble with the Merz system was, that it dealt only with garbage which had to be separated from other refuse. He urged the cremation of animal and household waste as far as possible in kitchen ranges and furnaces. Dr. Kilvington said that he had found no reason in the last year to change his belief that cremation, if not a perfect process, is at least the most desirable method for the disposal of the greater part of a city's refuse. After a few more speeches, Dr. Gibbon of the Marine Hospital offered a resolution providing that the committee on garbage be increased from eight members to nine, and be asked to report at the next convention as to the best method of handling refuse. This was adopted.

An important paper upon "Food in its Relation to Health" was presented by Professor W. O. Atwater. He spoke of the evils of over-eating, and gave tables of dietaries of various people, going to show that people in this country over-ate enormously, especially in the matter of meat and sweetmeats. Charts were shown on which the dietaries of people of various countries were displayed, compared with a standard dietary. The smallest dietary on which persons had lived for any great length of time was that of the Greeley party in the Arctic regions. The standard as estimated by German physiologists was exceeded by nearly all classes of workers in this country. Dr. Atwater compared the amount of food eaten by college professors, students, and families in New England, and gave many details of experiments. He said that the amount of food needed for intellectual exertion had not been estimated, and would require long and complex experiments, but it would be done some day. Much smaller quantities of food were needed than were actually used by many people in this country, with the result of undermining health to a great degree. The great cattle and pork business of the West, and the great corn-crop of this country, were responsible for the immense consumption of meat, and the

cheapness of sugar was responsible for the enormous consumption of sweetmeats.

In the discussion, Dr. Jerome Walker gave some facts from the experience in his own family. He claimed that meat once a day was enough for any ordinary person. The practice of children consuming large amounts of crackers was sharply condemned.

Edward Atkinson of Boston said he had carefully estimated the average size of the American man from facts obtained from dealers in ready-made clothing, and had found an increase. Mr. Atkinson said he had tried to reduce his waist without success, and by avoiding fat and sugar he had brought in seven devils worse than the first.

At the afternoon session the first paper was read by Dr. E. Plater of Ottawa, Can., on "The Prevention and Restriction of Tuberculosis in Man." He dwelt upon the importance of lung development as a means of prevention, and favored systematic exercises in the schools, calculated to produce such development.

Dr. P. H. Kretzschmar of Brooklyn read the next paper, on "The Prevention of Pulmonary Consumption." He said there was no such thing as consumption without bacilli. For that reason he had no doubt that the disease could be spread by contagion. Dr. Kretzschmar then went on to treat of the influence of heredity on pulmonary disease. He laid down the following propositions: First, If there are many children in a family, those born after the sixth or after the seventh are apt to develop pulmonary consumption; Second, If the children in a large family are born at short intervals, say, one year, the younger ones are apt to develop pulmonary consumption; Third, If the offspring of healthy parents, born under conditions named above, escape the disease, their children are apt to develop pulmonary consumption.

The doctor confessed that these views were novel, but said he believed that they were fully justified by his own experience and that of other physicians who had recorded their observations. Out of 556 cases which had been treated in Dr. Brohmer's sanitarium in Goerhersdorf, 4 were suffering from other diseases than consumption, 46 failed to give a satisfactory account of their family antecedents, 184 were offsprings of consumptive parents or grandparents; in 65 cases the disease came from the father, in 76 from the mother, in 14 cases from both sides, 16 times from the father's parents, 12 times from the mother's parents, and twice from the grandparents of both father and mother. Of the 322 remaining cases, 109 were from families with many children, and none of them were earlier born than sixth or seventh; 32 belonged to families where children had followed one another rapidly, mostly at intervals of one year; 147 were cases of acquired disposition. Of the 175 cases unaccounted for, 135 had parents who were born subject to conditions described in the doctor's first proposition.

In the discussion, Dr. Hibbard of Richmond, Va., dwelt chiefly on the necessity of easy-fitting clothing as a means of prevention. Then Dr. Plater took the floor in radical opposition to the whole theory of hereditary consumption. He was briefly answered by Dr. Kretzschmar.

Dr. Cyrus Edson of New York read a paper of great interest to medical men on the use of sulphur dioxide as a disinfectant. He had found this of great importance in tenement-house work against contagion in New York. This statement precipitated a discussion in the course of which the views of Dr. Edson as to the value of this agent were supported by Dr. Gray of Montreal, who told about its use in successfully stamping out a terrible epidemic in his city within six months. He said sulphur dioxide was of doubtful value only in the case of diphtheria.

Dr. Raymond of Brooklyn said the use of water with this agent was absolutely necessary. He asked whether the New York authorities had any record which would show the permanent effect of disinfection at any given time. Dr. Edson replied that the New York record showed every thing about the sanitary history of every house in the city where contagious diseases had occurred for three years back. Dr. Maxwell of Florida opposed Dr. Edson's conclusions, and insisted that it was doubtful whether sulphuric fumes were a safe disinfectant in any form. He backed up his position by reverting to the complete failure of this disinfectant in the yellow-fever epidemic at Tampa, Fla., Memphis, Tenn., and elsewhere in the South.

Many delegates took part in this debate. Dr. Edson said that the use of water with sulphur dioxide was a point on which he had not touched. Unhappy memories in his experience were connected with this practice. He tried it on 500 pairs of children's trousers. The water made a bleaching powder out of the disinfecting agent, and he had to pay damages on the trousers.

A general impression seemed to prevail, that, while sulphur was of use, it needed to be used with great care and thoroughness. Some delegates favored the substitution of chlorine. In answer to a question, Dr. Edson explained that in New York, when a room was to be disinfected, three pounds of sulphur were used for every thousand cubic feet of air. The sulphur was put on a dish in a tub of water, four ounces of alcohol to every three pounds were poured over it, and the alcohol was ignited.

Dr. John H. Roach of Chicago sent in the following preamble and resolution: "*Whereas* Asiatic cholera, leaving its usual restricted bounds, threatens to advance by the same lines that it has followed in the last four epidemics, be it resolved, that the American Public Health Association desires to call renewed attention to this fact, and to urge that quarantine authorities on the Atlantic and Pacific seaboards, and Boards of Health throughout the country, make every effort to prepare for this threatened danger." The resolution was at once referred to the executive committee.

In the evening a paper on "Sanitary Entombment," by the Rev. Charles R. Treat of this city, was the first. A carefully written paper on "Do the Sanitary Interests of the United States demand the Acquisition of Cuba?" was read by Dr. Benjamin Lee, secretary of the Pennsylvania State Board of Health. He summarized his conclusions as follows:—

"The exigencies of traffic and travel render rapid and constant communication between the United States and Havana a necessity. Havana is one of the most notorious breeding-places of yellow-fever, and is never free from its presence. The only means by which the germs of this disease can be eradicated are a proper system of sewerage and drainage, which shall deliver the filth of the city at a distant point into the waters of the ocean, and the removal of all the feculent soil. There is no hope that the Spanish Government will ever undertake a work of this magnitude for a dependency.

"The introduction of yellow-fever into the United States through both legitimate and illegal channels of trade must be of frequent occurrence so long as this condition of things continues. A single widespread epidemic of yellow-fever would cost the United States more in money—to say nothing of the grief and misery which it would entail—than the purchase money of Cuba.

"The precautions against the spread of small-pox in Cuba are entirely inadequate, and are rendered ineffective by reason of the superstition of a large proportion of the inhabitants: hence epidemics of that loathsome disease are of frequent occurrence.

"Leprosy prevails in Havana and the island of Cuba to a serious and constantly increasing extent. Leprosy is absolutely unrestricted in this island. While there is an immense and admirably administered leper-hospital in Havana, its inmates go and come among the residents of the city and country at will, until locomotion is rendered impossible by mutilation. The ravages of the disease are confined to no class or race. Leprosy has already obtained a foothold in the United States in the ports nearest to and in most constant communication with the island of Cuba. Leprosy has but one history, that of constant progression unless it is checked by isolation of the most absolute and unrelenting character. No centre of leprosy has ever originated in the United States. The importation of the first case of a series can always be distinctly traced."

A paper on "Railway Sanitation," by Dr. Samuel W. Latta, medical examiner for the Pennsylvania Railroad Voluntary Relief Department, was read, and, after some general discussion, the association adjourned till Friday.

On Friday the first paper read was by D. E. Salmon, D.V.M., chief of the Bureau of Animal Industry, Washington, D.C., upon "The Necessity for a More Rigorous Inspection of Meat-producing Animals at the Time of Slaughter."

Dr. Albert M. Gihon, U.S.N., read a paper on "The Causes of Infant Mortality," prepared by Dr. R. O. Beard, assistant commis-

sioner of health of Minneapolis. The various causes of the deaths of infants were carefully considered, being classified as arising from the bacillus tuberculosis and from nutritional and nervous disorders. For the first class the remedies were to be found in fresh air, disinfection, and the application of heat to all forms of infant food. The prevention of infantile disorders would be greatly promoted by the education of the people in sanitary matters. One of the great mistakes of the present day was to regard infants' stomachs as of a different character from those of adults. The writer said, "How long would the best of us of mature years withstand the terrors of marasmus if we should be confined in one or two close, stove-warmed or furnace heated rooms for an entire winter, without an excuse for ventilation or a sniff of outdoor air; if we were strangers, born and bred, to the taste of pure water or of any water; if we were compelled to be perpetually 'hungry' in order to get any thing to drink; if we revelled in ten or twelve square meals a day, and lunched at pleasure through the live-long night? And yet this is no parody upon the lives of infants in the majority of families in the humbler walks of life, and even among the educated classes. It devolves upon the medical profession, in the face of this prevailing ignorance, to educate the public in the principles of infant hygiene."

The paper further considered the various forms of food for children, and the writer said in conclusion, "The too frequent feeding of infants is a vice almost universally prevalent, and quite generally countenanced, or actually encouraged, by the profession. It is grounded in custom as absurd as the incasement of Chinese infants' feet in permanent baby-shoes. It is entrenched behind that most dangerous of all arguments—the argument from experience—among the ignorant, while it is condemned by every careful observation of the lower orders of animal life, and by every physiological principle bearing upon infancy."

Dr. G. C. Ashmun said that no class of the community needed instruction more in regard to this matter than the medical profession. While so much misinformation upon the subject existed, physicians needed carefully to consider the subject. Dr. Hibbard suggested that in the first twenty-four hours of the life of a child a foundation was laid for a life of health or disease. Health Officer Smith recommended more care in preparing death statistics, and that certificates setting forth debility, marasmus, or heart-failure as the causes of death be returned for correction. Dr. George H. Rohe suggested that all infants' food should be sterilized by boiling for ten or fifteen minutes. He wanted a fuller study of the causes of cholera-infantum. The outcome was the adoption of a motion by Dr. J. H. Raymond for a committee of five to consider the whole subject of mortality among infants, and to report at some future meeting.

Two papers by Edgar Richards, microscopist of the United States Treasury Department,—upon "American Methods of Manufacturing Oleomargarine" and "The Oleomargarine Law of the United States,"—were read by title. Charleston was selected as the place for the next meeting, and the date of meeting will be not earlier than Nov. 1, 1890. The following officers were elected: president, Dr. H. B. Baker of Lansing, Mich.; first vice-president, Dr. Frederic Montizambert of Quebec; second vice-president, Dr. Joseph H. Raymond of Brooklyn; secretary, Dr. Irving N. Watson of Concord, N.H.; treasurer, Dr. J. Berrian Lindsley of Nashville, Tenn.; executive committee, Drs. L. F. Solomon of Louisiana, William Bailey of Kentucky, H. B. Horlbeck of South Carolina, Walter Wyman of Washington, D.C., J. F. Kennedy of Iowa, Peter H. Bryce of Toronto, and the twelve ex-presidents of the association.

The total number of members who have attended the convention is 144. Resolutions of thanks were adopted for the hospitality of Brooklyn, with special thanks to Ex-Health Commissioner Raymond for his work in caring for the association.

#### ELECTRICAL NEWS.

##### A New Ammeter.

PROFESSOR H. J. RYAN of Cornell has invented an ammeter which *The Crank* states to be remarkable for its simplicity and accuracy, and describes as follows. It works on the same principle

as the Thompson electrical balance; but the latter is an expensive instrument, beyond the reach of the ordinary electrical engineer, and is not readily portable.

Professor Ryan's invention, consisting of a method of suspension and the laying-off of a scale, renders the construction of the apparatus a matter of a few hours' labor by any fair mechanic.

As in the Thompson balance, the current passes through two parallel fixed coils, and through a coil swinging between them. In the Thompson balance the current passes into this swinging coil through the suspension, consisting of a great number of fine copper wires, which will conduct a large current, but at the same time offers but little resistance to the movement of the swinging arm. The mounting of these wires is a very laborious operation, which adds greatly to the cost of the machine. Professor Ryan overcomes this difficulty thus. From each end of the axis of the arm a single silk thread extends upward through a hole in the hard-rubber framework above. These holes are drilled at an angle with the vertical, and the threads bearing on their upper acute edges form what is practically a knife-edge suspension. The current is taken into the coil by means of two broad strips of thin silver foil, fastened at one end to the base, at the other to the arm near the axis. This foil is so thin and light that it offers practically no resistance to the swinging arm, but at the same time is capable of carrying a very large current.

The balancing of the coil-bearing arm is accomplished by the movement of an arm carrying a weight and a pointer, and swinging in the horizontal plane. This arm has the greatest moment about the axis of suspension when it is perpendicular to it, and the least when it is parallel to it. In moving from one of the positions to the other, the pointer swings over a quadrant.

The force tending to move the coil, and hence the moment required to balance it, must be proportional to the square of the current. If on a line through the pointer pivot, and perpendicular to the axis of suspension, distances be laid off proportional to the squares of the currents, and perpendiculars be erected at those points, the distances of their intersections with the arc of the quadrant from the axis of suspension will be proportional to the squares of the corresponding currents. If these points be marked with the square roots of their respective distances, the instrument will give direct readings.

INDICATING TEMPERATURES AT A DISTANCE. — For many purposes it would be convenient if the temperature indicated by a thermometer, in some situation not easily accessible, could be telegraphed, as it were, to some spot convenient to the observer. Many methods more or less successful have been devised; and M. Morin, a French inventor, as we learn from *Engineering*, has recently patented another method, which, if of a somewhat limited range of applicability, may nevertheless be useful in certain situations. In a few words, his apparatus consists of a thermometer, with a scale about 8 inches long, reading from  $0^{\circ}$  to  $30^{\circ}$  C. The bore of the tube is about .02 of an inch in diameter, and the bulb is constructed to hold about 7 cubic centimetres of mercury. A platinum wire, with a diameter of about .0008 of an inch, runs from one end of the tube to the other, being connected with platinum terminals fused through the glass. The length of wire comprised between the  $0^{\circ}$  and  $30^{\circ}$  marks on the scale has a resistance of 200 ohms. The resistance of the whole thermometer, therefore, will vary considerably as the mercury rises and falls in the tube, and it is on this fact that the arrangements for telegraphing the temperature to a distant point depends. The receiving instrument consists of a low-resistance Deprez-d'Arsonval galvanometer, and an auxiliary resistance of about 200 ohms. Two Leclanché cells of large size connected in parallel, the electromotive force of which is very constant for varying temperatures, are employed to send a current through the thermometer, resistance, and galvanometer; and the deflection of the latter indicates the height of the mercury in the thermometer-tube.

METAL SHEETS AS ELECTRICAL SCREENS. — Professor O. Lodge contributed a paper, at the recent meeting of the British Association, "On the Failure of Metal Screens to screen off the Electrostatic Effect of Moving or Varying Charges," which is interesting, inasmuch as Maxwell suggested the bird-cage form as

the best form of lightning-protector. Professor Lodge has found, that, as long as a charge is stationary, the thinnest film of a conductor is indeed a perfect screen. An ordinary wire gauze is also impervious to electric disturbances from without, and so is a silver-coated beaker, as long as the coating is not too thin. This was investigated by placing a very light needle, highly charged with opposite electricities at its ends, within the beaker. When, however, the coating became thinner and thinner, so that the resistance of the silver film increased from a fraction of an ohm to 100 ohms and more, and when the charged bodies were rapidly approached, being shot towards the beaker sometimes, the needle was deflected, the deflections becoming measurable at 1000 ohms' resistance. One may simply say that the protection ceased as soon as the silver film became translucent, as Hertz has observed in his classical researches.

AUTOMATIC ELECTRIC BALANCE. — There has been exhibited in Paris an electric balance, the invention of Mr. William Snelgrove. The placing of the object to be weighed in the pan closes an electric circuit. The current along this circuit operates a motor attached to the weight on the beam, causing it to run out on the beam till an equipoise is established, when the circuit is broken. When the pan is cleared, every thing returns to the original condition.

## HEALTH MATTERS.

### Chloroform as an Anæsthetic.

A CONTRIBUTOR to *The Lancet* states that in the medical journals for the last ten years there are reported one hundred and twenty (if not more) cases of death under chloroform. Many of these are very imperfectly described, but in at least forty-nine cases the patients were in good general health at the time of administration, and required an anæsthetic merely for the performance of some minor operation; e.g., extraction of teeth (eleven cases of death), reduction of dislocations (nine cases), eye operations, fistulæ, and so on. In some fifty-nine cases death occurred before the commencement of the operation, and so was clearly due to the chloroform alone. In about twenty of the cases it is noted that chloroform had been successfully given on previous occasions, in one as many as eight different times before the fatal administration. It is evident from the foregoing that chloroform is uncertain in its action; that not only do people die while under chloroform, but also from it; frequently, too, even when it is used by skilful hands. Of course, it is possible to retort that "it was not properly given," which may be correct. This will not alter the fact that these accidents prove chloroform to be a powerful agent, very difficult to administer properly; indeed, so difficult and dangerous that it is scarcely suitable for a routine anæsthetic, when a drug less powerful for evil can replace it.

The nauseous flavor and the sense of suffocation from ether can be entirely done away with by the use of nitrous oxide, and its inhalation made more agreeable than even that of chloroform, while the patient quickly becomes unconscious without the struggling so common with chloroform. The writer goes on to say, "I have not yet found a single patient who has once inhaled ether preceded by nitrous oxide complain of suffocation, or object to take it again on the ground of its unpleasantness."

"The readiness with which chloroform affects the heart, the smallness of a fatal dose, and especially the ease and suddenness with which such a dose can be inhaled, almost by a couple of deep inspirations, will make its safe exhibition always a difficult task to invariably accomplish. Having had many years' experience, I have gradually come to believe chloroform to be a less safe anæsthetic than ether."

### Preventable Blindness.

AT a meeting of the Boston Society for Medical Observation, April 1, 1889, a paper was read by Hasket Derby, M.D., on this subject. We have recently published the report of the Albany committee on the increase in blindness. A certain proportion of this loss of sight is preventable. Being desirous of estimating the relative number of such cases in his own community, Dr. Derby



applied for permission to examine the inmates of the Perkins Institution for the Blind in South Boston, and was enabled to take notes of 183 cases, all but one of which he personally examined. The single exception was absent at the time of the visit, but his recorded history left no doubt as to the cause of his loss of sight. Following the classification of Magnus, Dr. Derby divided these cases into four classes: I. Congenital blindness; II. Blindness in consequence of idiopathic diseases of the eye; III. Blindness of traumatic origin; IV. Blindness attributable to general disease.

It is with the figures in the second class that we are more immediately concerned, and especially with those of blindness dependent on the ophthalmia of new-born children. There were 34 such cases out of 183, being a percentage of about 18.6. This is, however, a smaller proportion than has been obtained by other observers, and can only be accounted for by the limited number of individuals he was able to examine. At the Sheffield School for the Blind, Mr. Snell found 38.3 per cent blind from this cause, and observers in general estimate that some 30 per cent of all blindness is due to this disease. Even the examination at South Boston reveals the fact that at least one in every five of the inmates of the institution need not necessarily have ever come there. For it is an established fact that the ophthalmia of new-born children can, with few exceptions, be successfully prevented when there is reason to apprehend its occurrence. It is also not an exaggeration to claim that hardly a disease of the eye yields with more certainty to appropriate treatment. Modern observers are united in the belief that efforts at disinfection should mainly be directed to the eyes of the child, which are most apt to receive the poisonous matter after birth. Such being the case, is strict cleanliness alone sufficient, or should an active disinfectant in addition be employed?

Experiments carried on by different observers have demonstrated that the purulent infection of the eyes of new-born children can be reduced to a minimum by the use of a disinfectant, and that the most efficacious disinfectant is the nitrate of silver. Simple cleansing of the eyes with water was found by Bischoff to reduce the number of cases only one-half. Crede, the original proposer of the use of nitrate of silver, had, before the introduction of prophylaxis, 314 cases among 2,897 children, 10.8 per cent. After beginning to use the 2-per-cent solution of nitrate of silver, he had but from one to two cases in 1,160 children, being 0.1 to 0.2 of one per cent. Other agents have been tried.

In the present state of our knowledge, it is not presumptuous to assert that a case of this disease, terminating in a manner fatal to sight, and treated without topical applications of nitrate of silver, would be regarded as having been culpably neglected. So much for the principal factor that operates in causing preventable blindness. Of that from trachoma it is less necessary to speak, as that disease appears to be greatly decreasing in this community. The greater care used in the regulation of emigration, the gradual improvement in the housing and sanitary surroundings of the poor, and the discovery of jequirity as a remedy, are all working such a change for the better that one is almost justified in looking forward to a time when "granular lids" will be a tradition of the past. There is but one other cause of preventable blindness on which Dr. Derby briefly dwelt, — traumatic sympathetic ophthalmia, — of which he found 12 cases at the Blind Asylum, something over 6 per cent of all affections investigated. With young children the occasion for the occurrence of this disease is most frequently the wounding the other eye by forks, scissors, and knives carelessly left in their way. It can be guarded against by the timely removal of the injured eye.

To sum up the results of his investigation, Dr. Derby found 34 cases of ophthalmia neonatorum, 4 of trachoma, and 12 of the results of sympathetic ophthalmia, — together, 50 instances of preventable blindness; in all, 27 per cent of the inmates of the South Boston Asylum who need never have gone there had they received suitable care or enlightened treatment at the proper time. To diminish such a percentage in the future, the more careful medical education of the present day will not alone suffice. Those who propose to follow the profession of nursing must also be properly instructed, and some degree of knowledge on these subjects be diffused in the community.

**SUGGESTIVE THERAPEUTICS.** — Binswanger, in the *Therapeutische Monatschrift*, Heft iii., 1, 2, 3, 4, 1889, warns against the inconsiderate and incautious employment of hypnotism. He says that hypnotism under all circumstances has a disturbing effect upon the mental condition, and that subjects of experiment are always transiently hysterical, that the results in different individuals cannot be predicted, and that unfavorable results may follow. He further says, according to the *American Journal of Insanity*, that in severe hysteria is the chief ground for suggestive treatment, where the hypnotic suggestion is the most effective and the least dangerous. When other methods are available for cure, hypnotism is not needed, and in hysteria minor it should be kept in mind that the possibility of a transition into hysteria major cannot be excluded in the use of hypnotism.

**OXYGEN INHALATION.** — The opinions held among medical men concerning the therapeutic value of inhalations of pure oxygen are so various that any careful observations upon the subject are worthy of attention. In the *Practitioner* (August, 1889) Dr. Thompson discusses the subject from a theoretical point of view, and gives also the result of experiments upon animals and of observations upon patients. From experiment, and from consideration of the laws of physics as they bear upon the absorption of oxygen by the blood, it is quite evident, that, if an animal in a state of perfect health is made to breathe pure oxygen at the pressure under which this gas exists in the atmosphere, but very little more oxygen will be taken into the blood than if it breathed common air. In order to make any considerable amount enter the blood above that which is usually absorbed by it, a degree of pressure is necessary which causes mechanical interference with circulation and respiration. The old idea that animals cannot live in an atmosphere of pure oxygen is erroneous. As might be expected from the foregoing statements, it is now proven that animals can live for many hours in pure oxygen, under ordinary atmospheric pressure, without any symptoms or appreciable change, provided the CO<sub>2</sub> exhaled and the nitrogenous waste products of the body be removed. The vague and inconstant sensations, experienced by healthy persons who inhale pure oxygen freely, may be due to impurities contained in it. Practically, Dr. Thompson, as we learn from a summary in *Medical News*, has found the inhalation of oxygen valuable in many cases. In anæmia and chlorosis he has derived no decided benefit from it. In malignant diphtheria with rapid respiration, subjective dyspnoea, and cyanosis, relief was afforded only to the subjective dyspnoea, the cyanosis remaining the same, and the patient dying from pulmonary oedema and heart-failure. In a case of illumination-gas poisoning, with persistent unconsciousness and subsequent pneumonia, the continuous inhalation of oxygen had no effect whatever, either upon the breathing or upon the cyanosis which occurred during several attacks of pulmonary oedema. In a case of malignant endocarditis, with extensive valvular disease and dilatation, oxygen failed to relieve the dyspnoea, either before or after obstruction occurred in the lungs. In pneumonia, with rapid breathing, dyspnoea, and cyanosis, he has often found oxygen of very great value. The dyspnoea may diminish, while the cyanosis quickly vanishes, and the respiration becomes slower and more natural. So also in capillary bronchitis and asthma, especially when it is accompanied by much bronchial secretion. In uræmic dyspnoea he has found it of great use. In one such case, with normal lungs and very intense dyspnoea, lasting for three days, each inhalation of oxygen was followed in fifteen minutes by slowing and quieting of the breathing, slight improvement in the cyanosis, and great increase of comfort to the patient. Upon stopping the inhalation, the dyspnoea always returned. A bibliography of the subject is appended to the article.

#### NOTES AND NEWS.

**THROUGH** the efforts of Professor J. E. Denton, Stevens Institute is to have a new foundry and machine-shop. The building will be 40 feet long by 26 feet wide, and will adjoin the end of the main shop. It will be two stories high. The lower floor will be used as a foundry and blacksmith's shop, and the upper floor for wood-turning and carpentry.

— Mr. C. L. Heisler of Cornell is building a new form of calorimeter of his own design.

— Ernest G. Merrit of Cornell has been appointed instructor in physics at that university.

— Harris J. Ryan, M.E., instructor in physics at Cornell, has been appointed assistant professor of mechanical engineering.

— E. P. Roberts, M.E., last year assistant professor of electrical engineering at Cornell, is now with the Brush Electric Light Company, Cleveland, O.

— A new Yale movement, proposed by prominent graduates and patrons of the university, is for the establishment of a department of music, to be liberally endowed.

— Professor W. O. Atwater has been appointed director of the New Jersey Agricultural Experiment Station at Rutgers College. If he accepts, he will also retain his place at the head of the Washington Station.

— Francis John Henry Jenkinson, M.A., fellow of Trinity College, has been elected without opposition to the office of librarian of Cambridge University, England, vacant by the resignation of Professor Robertson Smith.

— During the summer, Professor Ryan and Mr. Merrit of Cornell were at work on alternating-current curves and converters. The results are very satisfactory, and will be published in a short time, says *The Crank*.

— The cap and gown movement at Johns Hopkins has received a setback. The class of '90 has voted against it, and the junior class has followed the example. The freshmen are not strong enough to make the movement a success.

— Dr. Albert Shaw is delivering at Cornell a series of lectures on the results of his fifteen months of study of European cities. It is rumored that he is likely to be called to the chair of political economy, left vacant by President Andrews of Brown.

— At a meeting of the New York Electrical Society in Clinton Hall on Oct. 24, Mr. A. A. Knudson read a paper descriptive of the recent electrical exposition at St. John, N.B., of which he had charge; and Mr. Joseph Wetzler, who had just returned from the Paris Exposition, described some of the electric plants and installations he had visited in Europe.

— Gen. M. C. Meigs of Washington has published a chart giving a graphic and tabular representation of the progress of population in the United States from 1750 to 1990, showing clearly the results of his study of the subject. To this he has added some notes of Great Britain, of Europe, of Spain, and of France, showing the law of population. While England doubled in forty years, Great Britain and Ireland required sixty-six years to double, owing to the decrease of the Irish population in their original seat.

— The *Student* of Amherst is advocating the formation of State clubs in the college similar to the organizations in other colleges. It says, "We have thirteen men from Connecticut. Why can't they defy fate and organize a thirteen club? Illinois sends eleven students who could influence others in that State to 'come East' to college; New York State sends sixty-one, whose influence could certainly be brought to bear upon the preparatory schools in the large cities, showing the advantages to be derived at Amherst. Other States send from seven to fifteen men each."

— From a series of experiments in preventing the injuries of the plum curculio, Mr. Clarence M. Weed, of the Ohio Agricultural Experiment Station, has arrived at the following conclusions: (1) that about three-fourths of the cherries liable to injury by the plum curculio can be saved by two or three applications of London-purple in a water spray, in the proportion of one ounce to ten gallons water; (2) that a sufficiently large proportion of the plum-crop can be saved by the same treatment to insure a good yield when a fair amount of fruit is set; (3) that, if an interval of a month or more occurs between the last application and the ripening of the fruit, no danger to health need be apprehended from its use; and (4) that spraying with the arsenites is cheaper and more practical than any other known method of preventing the injuries of this insect. The experiments were carried on through two sea-

sons, upon two varieties of cherry-trees and four varieties of plum-trees, during which a grand total of 65,500 cherries were individually examined. They are described in full in Bulletin No. 6, Vol. II., of the Ohio Station.

— Some Italian observers have been recently testing the senses of criminals, and they find these duller than in the average of people. Signor Ottolenghi, in Turin, found last year a less acute sense of smell in criminals; and he now affirms the same for taste, which he tested, according to *Nature*, by applying bitter and sweet substances (strychnine and saccharine) in dilute solution to the tongue. He finds also the taste of the habitual criminal less acute than that of the casual offender, and a slightly more acute taste in male than in female criminals. Experiments with regard to hearing were made by Signor Gradenigo (also in Turin); and, of 82 criminals, he found 55 (or 67.3 per cent) to have less than the normal acuteness, the greatest inferiority being in the oldest. In female criminals the relations were somewhat better: 15 out of 28 had hearing under the average. The limits of variations in acuteness also appeared to be much wider in criminals than in normal persons. Ear-disease was common. Signor Gradenigo attributes these things to bad hygienic conditions of life, and vicious habits.

— The projected course in military science and tactics at the Sheffield Scientific School has not yet been completed. Lieut. Totten is reported in the *Times* to say, "The course as it is crystallizing tends toward a discussion of military economy in reference to this country. In handling the American military problem, I shall attempt to discuss re-organization rather than the organization as it now stands. The topics which are so ably treated of in the magazines will be avoided, as the magazines are at the disposal of all. In discussion of tactics I shall avoid the American definition, which is mere 'drill,' preferring the European idea of 'use,' illustrating the tactical use of infantry by reference to the Turko-Russian war, and the tactical use of artillery by reference to the Franco-Prussian war. The United States is behind the times in the military line. This course of instruction is an important one, and I shall do all in my power to awaken the students to the military needs and possibilities of this country. We have not yet made any arrangements for the organization of a military company at Yale, but I should like nothing better than a splendid battalion, worthy of the institution." It is expected that the course will consist of twelve lectures, to be delivered weekly, beginning early in January.

— In a recent bulletin of the Ohio Agricultural Experiment Station, a number of experiments to determine the preventive or remedial value of various methods recommended to prevent the injuries of the striped cucumber beetle are described. They were carried on under the direction of Mr. Clarence M. Weed, entomologist and botanist of the station. These methods were, for the sake of convenience, divided into four classes: 1. The use of offensive odors; 2. Mechanical coatings of the leaves; 3. Poisonous coatings of the leaves; 4. Enclosing plants under tents or gauze-covered frames. The experiments were made on a large scale under ordinary field conditions, during the summer of 1889, when the striped beetles were exceedingly abundant. Five substances of the first class were tested; viz., hen-manure, cow-manure, kerosene, carbolic acid, and bisulphide of carbon. None of these proved practically successful. Three substances of the second class were tested; viz., coal-soot, gypsum, and saltpetre. Of these, coal-soot and saltpetre proved worthless, while gypsum showed some beneficial effect, not sufficient, however, wholly to save the plants. Three substances of the third class were applied; viz., pyrethrum, slug-shot, and peroxide of silicates. Pyrethrum killed those beetles with which it came in contact when first applied, but soon lost its efficacy. Slug-shot injured the plants to which it was applied. Peroxide of silicates had a decided effect in preventing injury, and, where the plants had been well started before being attacked, saved them from destruction; but it did not save them where the beetles were so numerous that they burrowed down to meet the sprouting plants. The results obtained from the fourth method, that of fencing out the insects by covering the plants with some form of tent or gauze-covered frame, were by far the most satisfactory. The cheapest and most successful method employed is that of

protecting each hill by a piece of plant-cloth or cheese-cloth about two feet square. This may be done simply by placing it over the plants, and fastening the edges down by small stones or loose earth. It is better, however, to hold it up by means of a half barrel-hoop or a wire bent in the form of a croquet arch.

— Since the Johns Hopkins Hospital was opened, the *Times* reports that over 400 patients have been received. It now contains 109. The training-school for nurses is making good progress. Arrangements are being made to publish regularly the discoveries and observations of the experts of the hospital. This publication department is expected to be of value to medical literature. The *Bulletin* will be issued monthly, and will correspond with the *Circular* of the university, but other more important papers will be added from time to time. In the *Bulletin* will be the proceedings of the newly organized medical society. This society is modelled on the plan of the one connected with the Charité of Berlin; and its object is to bring the men connected with the hospital into closer connection, to stimulate research, and to protect the claims of priority of work done by the members. Dr. Welch is the president, and Dr. Robb is the secretary.

— A new soft alloy, which adheres so firmly to metallic, glass, and porcelain surfaces that it can be used as a solder, and which, in fact, is invaluable when the articles to be soldered are of such a nature that they cannot bear a high degree of temperature, consists of finely pulverized copper dust, which is obtained, according to *Iron*, by shaking a solution of sulphate of copper with granulated zinc. The temperature of the solution rises considerably, and the metallic copper is precipitated in the form of a brownish powder; twenty, thirty, or thirty-six parts of this copper dust, according to the hardness desired, being placed in a cast-iron or porcelain-lined mortar and well mixed with some sulphuric acid, having a specific gravity of 1.85. To the paste thus formed are added seventy parts by weight of mercury, with constant stirring; and, when thus thoroughly mixed, the amalgam is well rained in warm water to remove the acid, and then set aside to cool. In ten or twelve hours it is hard enough to scratch tin. On being used, it is heated to a temperature of 375° C., and, when kneaded in an iron mortar, becomes as soft as wax. In this ductile state it can be spread upon any surface, to which, as it cools and hardens, it adheres with great tenacity.

— Professor Arthur Winslow, who was lately elected State geologist of Missouri, has established his headquarters at the State capitol. The State appropriated \$20,000 for the maintenance of a geological bureau during the years 1889-90. In 1873-74 Professor Broadhead made a partial survey of some portions of the State, but for lack of funds was unable to continue the same. The United States Topographic Survey covers the counties of Jasper, Barton, Vernon, Bates, Cass, Jackson, Clay, Platte, Ray, Lafayette, Johnson, Henry, St. Clair, Cedar, Dade, Lawrence, Greene, Polk, Hickory, Benton, Pettis, Saline, Carroll, Howard, Cooper, Morgan, Camden, Miller, Cole, Moniteau, Boone and parts of Monroe, Audrain, Pike, Montgomery, Callaway, and St. Louis. This is but a fraction of the mineral-bearing lands of Missouri. The director of the United States survey has notified Professor Winslow that the government will co-operate with the State, and will put a full corps of surveyors in the field next spring, who will work in such localities as the State geologist may direct. Professor Walter P. Jenney has been assigned work in surveying the lead and zinc deposits. James D. Robertson of Washington University, St. Louis, has been appointed assistant to State geologist; Dr. Hambach of Washington University, St. Louis, assistant paleontologist for the State; Elston Lonsdale of Columbia, aid to paleontologist; Leo Gluck of Lamonte, aide and mining engineer. Professors Jenney and Robertson have been assigned work at Joplin, and they will perform co-operative work in regard to the lead and zinc deposits of that locality, and, when completed, extend eastward. Professor Lonsdale has been directed to collect material from the vicinity of Columbia. Leo Gluck has been assigned to the coal-fields. His first work will be in Pettis, Johnson, Lafayette, and Bates Counties. Professor Winslow will first take up the lead and zinc deposits, detail examination of coal-fields, study of building-stone, clays, and sands of the State respectively. The coal-fields of the

South-west will receive attention prior to other localities, on account of their magnitude. An investigation of the lead and zinc fields will commence first at Joplin, and extend to Springfield, and from thence to Franklin County. Building-stone, clay, and sand will be examined from all parts of the State, and tests of the quality and durability made. Regarding the local reports from Ripley, Madison, and other South-east counties, of the discovery of gold and silver ore in paying quantities, Professor Winslow says that he has no official information regarding the same. He says that there is silver in South-east Missouri, but whether or not it can be found in paying quantities he is not able to say.

— James Prescott Joule, one of the discoverers of the mechanical equivalent of heat, died at his home in Sale, near Manchester, England, on the 11th of October, after many years of feeble health. Dr. Joule was born at Salford, Dec. 24, 1818. In his early days he studied chemistry under Dalton. In 1841 and 1842 he worked on the subject which made his name known among physicists, and in 1843, at the Cork meeting of the British Association, published the results in a paper entitled "The Calorific Effects of Magneto-Electricity, and on the Mechanical Value of Heat." For the experimental proof contained in this paper of a definite quantitative relation between heat and work, Dr. Joule was honored by the presentation of medals by the Royal Society, the English Society of Arts, and others. He was the author of a large number of papers, which have been published in collected form by the Physical Society.

— *Garden and Forest* states that President Horace Davis, of the University of California, recently received an inquiry from Algeria concerning experience on the Pacific coast with grasses for restraining drifting sands. As much of this kind of work has been done at Golden Gate Park, in San Francisco, the experience of Mr. John McLaren, the efficient superintendent of the park, was asked, and his statement has been forwarded to the distant applicant. Part of the information given by Mr. McLaren is quoted as follows in the *Pacific Rural Press*: "The grasses found most successful here are the Sea Bent grass (*Calamagrostis arenaria*) and the Bermuda grass (*Cynodon dactylon*), both of which have been entirely successful in holding the loose sand. I would plant the Sea Bent in the most exposed places, and the Bermuda on the protected slopes. We plant in rows one and one-half to two feet apart and one foot deep. Where practicable, the plough is used, dropping the roots in each alternate furrow. Where the dunes are too steep for ploughing, pits are dug with the spade, and, after planting, the sand is trodden firmly with the foot. The plantations have to be examined after heavy wind-storms to replant any roots exposed by the wind. If seeds only can be procured, I would suggest that they be sown in nursery rows, and the plants set out the following season." Of course, there are also many shrubs used, and the nursery at the park has propagated a vast number of the *Leptospermum* and other shrubs which have been found serviceable.

— It has always been the desire of engineers to obtain "black" prints from plans and drawings, in place of the present blue-prints. The discovery of a new substance by a French chemist, M. Pechar, announced in *Iron*, may make such a result possible. It is a mixed acid derived from oxalic and molybdic acids, and is therefore termed "oxalomolybdic acid." The crystals of oxalomolybdic acid, when dry, may be preserved unchanged, either in sunshine or in the dark; but if moist they quickly become colored blue when exposed to the sun's rays. If characters be written on paper with the solution, they remain invisible in a weak light; but, when exposed to sunshine, they rapidly become visible, turning to a deeper indigo-color. It is curious that this effect only happens when the solution is spread over paper or other surfaces; for the solution itself may be kept unaltered in the bottle for any length of time, except for a trace of blue at the edge of the meniscus, where by surface action a little is spread against the interior glass walls. If a sheet of paper be immersed in a saturated solution of the acid, dried in the dark, and then exposed behind an ordinary photographic negative, a very sharp print in blue may be obtained by exposure to sunlight for about ten minutes. The color instantly disappears in contact with water; so that, if a piece of this sensitized paper be wholly exposed to sunlight, one may write in white



upon the blue ground by using a pen dipped in water. If, however, the paper with its blue markings be exposed to a gentle heat for a few minutes, the blue changes to black, and the characters are then no longer destroyed by water.

— At the thirty-ninth meeting of the Institute of Electrical Engineers of this city, on Oct. 29, Mr. George B. Prescott, jun., read an interesting paper on some methods of regulating accumulator batteries in electric lighting. The paper was well illustrated by numerous diagrams.

— There was a preliminary meeting of the International Congress on Celestial Photography at Meudon, France, on Sept. 20, to consider the programme that had been drawn up by the provisional committee. A few slight alterations were made in the original scheme, as we learn from *Nature*, but the details of the work were not entered into. It was, however, decided that the greatest latitude should be allowed in the choice of instruments, and that each observer should employ that instrument to which he was accustomed, having no regard to uniformity. In order to indicate the spectroscopic work included in the programme, a change in the style of the congress was agreed to. It is henceforth to be the "International Congress on Celestial Photography and Spectroscopy."

— Mr. Hannay summarized his new white-lead process at the recent British Association meeting by stating that the lead ore as it comes from the mines is volatilized and oxidized by the air, the fumes are condensed in a slightly acid liquor, and the resulting sludge is washed and dried for the market without having been touched by the men. He does not employ women at all in his Glasgow works. The condensed material is extremely fine, firm, and of great covering power. The volatilization is effected in an ordinary lead-smelting furnace, but here the object is to get as much fume as possible. The advantages of this process are, that the white lead is made in a day instead of the three months of the Dutch process; that it starts with the ore, and not with the purified metal; that it is obtained in a fine powder instead of a hard crust, which has to be ground; and most important of all, as *Engineering* points out, that there is hardly any danger for the workmen. Some of these advantages, claimed specially as regards the purity of the product, were, however, questioned by Sir Lowthian Bell, although the process might develop.

— In the April bulletin of the Hatch Experiment Station of the Massachusetts Agricultural College at Amherst, report was made of the results of heating, during the months of January and February, two greenhouses built side by side, of the same size, one by means of steam, and the other by hot water; the conditions being the same as far as possible, except that the house heated by hot water was more exposed to the prevailing westerly winds than the other. The results were so marked, and so decidedly in favor of the hot-water system, that the report has provoked many inquiries and some criticism. In order to make their position more fully understood, and to answer some of the questions that have arisen, they make some further explanation of the conditions under which the tests were made, and report the results obtained for the months of March and April. With other boilers and with other conditions, different results may possibly be obtained; but they know of no recorded experiments where accurate observations have been made, most of the reports being based upon guess-work or casual observation. The boilers used consist of cast sections, arranged in such a manner over the grate as to form a return flue arrangement, the smoke passing off in the front. In the hot-water boiler five sections were used, the area of heating surface exposed to the fire being 74.5 feet. The steam boiler consists of eight sections, the aggregate area exposed to the fire being 61.12 feet below the water-line, and 24 feet above, making the total heating surface of the steam boiler 85.12 feet. Tables are published in the bulletin for October showing the comparative results of the use of the two boilers for the months of March and April, 1889. These tables show that the average temperature of the house heated by hot water was 2.3 degrees higher than that heated by steam, and that the amount of coal consumed was one ton 106 pounds less in the former than in the latter. The total coal consumed by the hot-water boiler from Dec. 23, 1888, to April 24, 1889, was four tons

1,155 pounds. The average daily temperature for the four months was 53.5°. The total coal consumed by steam boiler from Dec. 23, 1888, to April 24, 1889, was 5 tons 1,261 pounds. The average daily temperature for the four months was 51.2°.

— The strawberry crop in Massachusetts this season, as reported by Samuel J. Maynard of the Hatch Experiment Station, Amherst, Mass., has been much smaller than for the past ten years. The causes that have contributed to this failure are in part the cold, wet summer of 1888, which promoted a late growth, in which the fruit-buds were not matured sufficiently to withstand the winter; the long, open winter, in which the plants were not well protected, and the continued wet weather of the past spring, preventing perfect fertilization. Few, if any, of the new varieties have shown qualities which make them superior to those already in general cultivation. The tendency of the market has been to demand large berries at the expense of quality. Such berries can only be grown under the highest state of cultivation, which many growers have not yet learned is a necessity to the profitable growth of the strawberry.

— Mr. Clarence M. Weed, entomologist and botanist of the Ohio Agricultural Experiment Station, summarizes the results of a series of experiments on the prevention of injuries of the potato-rot as follows: (1) that a large proportion of the injury done by the potato-rot can be prevented by spraying the vines with the Bordeaux mixture; (2) that this treatment apparently diminishes the amount of scab affecting the tubers; (3) that by adding London-purple to the mixture the same treatment may be made effective in preventing the injuries both of the rot and Colorado potato-beetle.

— Extralite, a compound which belongs to the pancastite group of explosives, is very similar to roburite, securite, bellite, romite, etc., and, like them, depends for its action upon a non-explosive combustible agent which becomes explosive by the admixture of an oxidizing agent. It is a mixture of ammonium nitrate, potassium chlorate, and naphthalene, and in appearance resembles C sugar as far as color and consistency are concerned. It is claimed for it that it is safe to handle, not liable to spontaneous ignition or accidental explosion (such as may be caused by striking or concussion due to falling against hard surfaces, like iron or stone), not liable to freeze, not explosive in ignition by flame, and can only be exploded by percussion-caps and when within rigid enclosure. The latter quality has made its use practicable for shells and other projectiles, but it is chiefly for mining and blasting purposes that it is recommended. In some experiments performed with it on the line of excavation and blasting for the laying of water-pipes in Central Park, opposite West 97th Street, and described in *The Engineering and Mining Journal*, its claims were fully demonstrated. A fire was built of wood and paper saturated with kerosene, into which several cartridges were opened, but the preparation only burned away without any evidence of its explosive power. A percussion-cap and fuze were attached to an extralite cartridge, and the fuze lighted. The cap went off, but the cartridge remained intact. Equally futile were all efforts to explode it by pounding it on a rock. Finally three borings in the solid rock were loaded with it. One hole was eighteen inches deep, and eight ounces of the explosive were rammed into it. The others were twelve and eight inches respectively, and four ounces were put into them. The charges were connected and fired. The result was perfectly satisfactory, and demonstrated its special power as a rending agent. While dynamite has greater influence, by its very rapid action in pulverizing the surrounding rock, this explosive, although equally as powerful, by its more retarded action expends its force in shattering larger weights of rocks. It is claimed for this preparation that its use for blasting purposes in mines is of great value, owing to the fact that no noxious fumes are generated, and that the powder is almost smokeless. This statement has been disputed in England by those who have used roburite, although that explosive has received very high recommendations from certain quarters. It is interesting to note that extralite is the first of this class of explosives to be manufactured in the United States, and, owing to its general safety, it may prove a formidable rival to the various dynamites now on the market.

## SCIENCE:

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Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

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TO-DAY QUITE AN IMPORTANT CHANGE takes place in the office of the hydrographer of the Navy Department. Lieut. George L. Dyer, who has occupied that position, vacates the office to perform a tour of duty at sea in conformity to the usage obtaining in our naval service, which, however efficient an officer may have been in the performance of duty, requires that tours of service on shore must alternate with those afloat. During the time that Lieut. Dyer has been associated with the office, both as principal assistant and as hydrographer, numerous changes of great benefit to the naval service have taken place. The establishing of the branch hydrographic offices has proved remarkably successful, and their importance is acknowledged by the maritime community the world over. The issue of the "Pilot Charts" and their supplements was begun, and they have rendered themselves indispensable authorities for all shipping that crosses the Atlantic. The office in Washington has been greatly enlarged, and its facilities for coping with the marvellous increase of work have been greatly improved. The assumption of the collection of meteorological data from the merchant marine, the improvement in the office publications, and the establishment on a permanent basis of the division of marine meteorology, are all matters of the greatest benefit and importance, and bear the impress of the ability of the officer controlling them. The matter of the use of oil at sea and the dissemination of data collected in relation thereto among seafaring people has probably

received as much of the personal attention of Lieut. Dyer as any other important feature of his *régime*; and he leaves his office with the satisfaction of knowing that his efforts in the great cause of humanity have been the means of saving hundreds of lives and much property, the value of which can hardly be estimated. We take pleasure in wishing Lieut. Dyer an enjoyable cruise, with the hope that his pouring oil upon the troubled waters for the sake of others may result in his having smooth seas and safe voyages wherever duty may call him.

AS THE DISCUSSION of a possible world's fair somewhere on this continent in 1892 is now going on, a study of the results of the Paris Exposition is in order. Any such exhibition brings to the city in which it is located a great accession of transient population, with a resulting strain upon the resources of that city in its facilities for transporting, housing, and feeding. Every stranger, when he reaches Paris, is recorded by the police; every pound of food and pint of drink that enters the city gates is taxed; the railways make prompt and detailed returns of their business; the theatres make returns; and in various ways the facts that show how a great city is affected by these crowds of strangers are better known in Paris than they could be in any American or English city. Such of these statistics as have been published show that the total number of visitors, or visits, will exceed 24,000,000. The maximum attendance so far was on Sunday, Oct. 13, when 402,000 were recorded. This may, however, be exceeded, as the attendance shows a tendency to increase as the closing day, Nov. 6, draws nearer; the fall in the price of tickets, which has been very great, doubtless having its effect as well. Up to Sept. 30, the attendance recorded at the gates was 19,405,701, and the daily average had been 130,000. The daily averages at previous exhibitions have been, at London, 1851, 40,000; Paris, 1855, 24,000; London, 1862, 34,000; Paris, 1867, 42,000; Vienna, 1873, 40,000; Philadelphia, 1876, 61,000; and Paris, 1878, 70,000: so that the average daily attendance of the exhibition about to close has been nearly double that at the last held in Paris, which was the largest up to that time. The transportation statistics are too imperfect yet to be of much interest, the greater portion of the travel of the railways coming as late as August, for which month the returns are not available. Still we find that in May, June, and July, 10,704,703 persons arrived in Paris in 1889, against 9,647,289 in 1888, an increase of 1,057,414; and in the same period 10,782,766 left, against 9,562,019 in 1888, an increase of 1,220,747. There were, on the average, 25,000 more passengers passed through the principal Paris stations each day during these months than in the corresponding months of 1888. It is estimated that 120,000 Americans flocked to the exhibition. Of the patronage of the hotels it can be said that they received more than twice as many guests in the three months for which we have figures as in 1888. That Paris consumed more food during the exhibition cannot be doubted, but it is strange to have to record a falling-off in the consumption of beef when so many supposed beef-eaters were added to the population. Nor did these visitors show any inclination to feast on horses or donkeys, two items of food which showed only the normal increase of late years. The theatre-owners, and the proprietors of places of amusement in general, feared that the exhibition might prove a damaging rival. The tax returns show just the opposite, being more than double those in the previous year.

## ANNUAL REPORT OF THE HYDROGRAPHER.

THE annual report of the hydrographer of the Navy Department contains much of great value to the maritime community, and gives a most comprehensive review of many of the important changes that have taken place in that office during the period that Lieut. Dyer, the outgoing hydrographer, has been connected with it.

The necessity for an earnest co-operation with the Army Signal Service is particularly dwelt upon, and it is clearly shown what

great benefits have already been derived by the community at large from the two services acting in unison. It is further stated in regard to marine meteorology that the navy can now be kept conversant with the latest information touching upon this important subject, the serious study of which had been neglected by the department for many years. One of the reforms of the office has been the establishing on a permanent footing of this division, where the collection and dissemination of data could be carried on without interruption, and where instructions for the service could be prepared and revised in accordance with the progress of the science of meteorology. It is suggested that the Navy Department should establish stations throughout the West Indies, and, in co-operation with the Signal Service, bring the subject of West Indian hurricane warnings to a greater degree of perfection.

The policy of the office in encouraging its employees to improve the character of their work, either by the invention of apparatus or in the preparation of original matter in manuscript, has shown remarkably good results, as have also the efforts made to improve the chart service to ships of war. It is concisely pointed out where improvements can be made in this latter feature, and recommendations are submitted that are well calculated to secure in the near future a still better service. It is also hoped that with the increase in the number of charts, and the augmentation of our foreign commerce, the revenue derived from the increased sale of charts will finally result in making the office self-supporting.

Considerable attention is paid to the subject of the international marine conference, and to the collection by the branch offices of material of value placed before the United States delegates for their consideration; and it is confidently believed that the publicity given to the subject of floating wrecks, fogs, ice, safe routes, and so forth, by the monthly "Pilot Charts" and by the branch offices, has had an important bearing upon the bringing-together of the delegates forming the conference. At the same time full credit is given to Mr. Francis Houghton, superintendent of the Maritime Exchange of New York, to whose active and efficient management is mainly due the passage of the act of Congress creating the conference.

It is suggested that all naval surveying work be under the immediate supervision of the Hydrographic Office, as it is thought that greater economy is possible by such an arrangement, and that the requisite degree of efficiency can only be attained by uniting all the functions of a surveying office with those that the Hydrographic Office possesses at present. A surveying branch being considered a necessary part of the naval establishment, it is thought that special inducements must be held out to officers who are willing to take up this work; and it is hoped that the days for perfunctory service in the Hydrographic Office have departed.

The system of branch offices having proved its great value to the maritime community, its extension is recommended to include every shipping port of importance on our coasts. It is thought by so doing that the Navy Department can maintain itself as the natural leader in all subjects of a hydrographic nature, to which the best interest of the government and the technical education of its officers clearly entitle it.

It is recommended to erect a separate and specially constructed building for the use of the office, the necessity of having commodious and well-lighted rooms for draughtsmen and engravers being obvious. Series of charts for China and the East, a pilot chart for the Pacific, and permanent parties for the determination of the earth's magnetism, together with more extended surveys of those portions of the world in which our trade is active and growing, are all points well worthy of the enacting clause of Congress.

#### BOOK-REVIEWS.

*Hygiene and Public Health.* By LOUIS C. PARKES, M.D. Philadelphia, Blakiston. 12°. \$2.50.

DR. PARKES comes before us indorsed as the assistant professor of hygiene and public health at University College, London; and he assures us that it is as a result of his experience as a teacher at that institution that he was led to believe that a small book, clearly written, on hygiene, would serve a good purpose. The author has aimed to cover the whole field of sanitary science, and

has given such elementary information on every topic as will enable the reader to refer with advantage to the larger text-books.

The necessity under which health-officers often find themselves of dealing with figures and statistics has induced Dr. Parkes to introduce as a closing chapter a discussion of statistics, and how to handle them in so far as they are likely to be of value to those whom he aims to assist. Medical men find trouble in this mathematical part of their work, and will be interested in this novel chapter.

As good drainage is all-important for the preservation of public health, we find Dr. Parkes has devoted considerable space to the methods of disposal of refuse.

The opening chapter is, however, on water. It is one of the longest, and is written with the good judgment displayed throughout the book.

The other chapters are on ventilation, warming and lighting, climate (in which it is possible undue attention is given occasionally to matters which might be assumed as known), soils and building-sites (a chapter likely to interest many), exercise, and contagion. Throughout, the book is written so as to be interesting and intelligible to laymen and doctors alike, and we take pleasure in calling attention to it.

*Alternate-Current Machinery.* By GIBBERT KAPP. New York, Van Nostrand. 24°. 50 cents.

THIS timely little volume had its origin in a paper read before the Institute of Civil Engineers, London, by Mr. Kapp, whose name and reputation as an electrician are well known to all interested in the progress of electrical science. It is reprinted, in convenient pocket form, from the minutes of the proceedings of the society before which it was read, and contains, besides Mr. Kapp's paper, the comments and criticisms made upon it by many eminent electricians, members of the institute, and Mr. Kapp's replies and explanations. The book appears at an opportune moment, as the matter it contains derives additional interest from the fact that the sharp competition at present existing between advocates of the direct-current and those of the alternate-current systems of electric lighting is compelling closer attention to all that is published concerning both systems, or groups of systems.

The subject comprised under the title of the work is divided by the author into six sub-sections: 1. Alternators; 2. Transformers; 3. Motors; 4. Meters; 5. Mains; 6. Accessory apparatus for use in central stations and on the premises of the persons supplied with current from such stations. The question of lamps Mr. Kapp considers as somewhat foreign to the subject under consideration, as glow, or incandescent, lamps are equally suitable to be fed by alternating and direct currents, and arc lamps are adapted to either current by changes easily made. Alternators, transformers, and motors, — the three main points, — of course receive more attention from Mr. Kapp than the subsidiary ones, though no point has been left far in the background.

*A Handbook of Descriptive and Practical Astronomy. I. The Sun, Planets, and Comets.* By GEORGE F. CHAMBERS. 4th ed. Oxford, Clarendon Press. 8°. \$3.

NEARLY thirty years ago Mr. Chambers had ready the first edition of this handbook, which was designed as a handbook that should be attractive to the general reader and of occasional service to the professional astronomer. The author aimed to make a book that should be popular without being vapid, and scientific without being unduly technical. That he was reasonably successful we all know.

A second edition followed in 1861, and a third in 1876. And it should be called to mind that this was the work of an English barrister, who could spare for his hobby, as it were, but a part of his time, mainly absorbed by his professional engagements.

The volume we have before us is the first volume of the fourth edition. The plan at first was to break the work up into two volumes, but the material proved so large in amount that three were finally decided upon; and the author finds himself in a position where he can carry out his original conception of what such a treatise should be.

In this volume we have the descriptive astronomy of the sun,

planets, and comets; the second, to be issued at an early date, will contain an account of astronomical instruments and practical astronomy; and the third will be devoted to the starry heavens. Each volume will have its own index, and will be sold, as it in truth will be, as a distinct book, though of course forming part of the series of three.

Of speculation there is little to be found within the covers. If one looks for discussion of the possibility of life on any of the planets aside from the earth, he is likely to be disappointed. But the book is full of straightforward statements of the facts so far as we know them, and it may be said that it is well brought up to date.

*Chambers's Encyclopædia.* New edition. Vol. IV. Dionysius to Friction. Philadelphia, Lippincott. 8°. \$3.

THIS volume contains a goodly number of articles of specially scientific interest. The list of American contributors is not large, nor is it to be expected that it should be. Oliver Wendell Holmes, perhaps, leads in importance in this list with an article on Emerson. The others by Americans are on local geographical matters and on Ben Franklin.

It is perhaps unnecessary to call attention again to the purpose of this encyclopædia, which gives authoritative matter well condensed in its short articles, which often come down to a single paragraph; yet many ask which is the best of the encyclopædias, and show that they are not acquainted with the characteristics of those offered.

In this volume we have short articles, devoid of all technicalities, on dynamos, electric light and railway, by Professor J. A. Ewing; earthquake, by Professor James Geikie; electricity, by Professor C. G. Knott; evolution, by Professor Patrick Geddes; exhibitions, by H. Roscoe Dumville; force, by Professor Tait. But we could fill a page with a list like this.

There are eight colored maps in the volume, — one of the District of Columbia, another of Florida, the others being devoted to Europe, England, and France. A colored plate shows the flags of all nations.

There is as much space given to electricity as to any other subject in the volume, the article sketching the phenomena of electrification, electric currents, and resistance, and the resulting electrolysis and thermo-electric effects. We do not find any reference to the lately developed Hertz effects, which were probably published too recently for insertion. The limitations in the scope of this main article are atoned for in the adjunct articles on atmospheric and medical electricity, electric fishes, electric light, railways, electro-metallurgy, and others to the number of a dozen or more.

The article on exhibitions is naturally examined at this time, and it is somewhat amusing to find the Paris exhibition of this year referred to in the past tense; which shows, however, a due amount of care in bringing the matter up to date.

*Hints to Travellers, Scientific and General.* Edited for the Council of the Royal Geographical Society by DOUGLAS W. FRESHFIELD and Capt. W. J. L. WHARTON. 6th ed. London, The Royal Geographical Society. 24°.

THESE "Hints to Travellers" had their origin in a report made to the council of the Royal Geographical Society as long ago as 1854. This report was drawn up by Admiral Fitzroy and Lieut. Raper of the Royal Navy, and aimed to answer the numerous queries addressed to the society as to the proper instrumental outfit for explorers.

This report, to which were added some suggestions by Admirals Smyth and Beechey, Col. Sykes, and Mr. Francis Galton, was published in the journal of the society, and republished in pamphlet form.

The exhaustion of this first edition led, in 1864, to a revision, in which Sir George Back, Admiral Collinson, and Mr. Galton, assisted; chapters on photography by Dr. Pole, and collection of objects in natural history by Mr. Bates, being added.

The editions of 1871, 1878, and the fifth, the date of which we do not now recall, followed. In each some wise development of the original plan, without any undue increase in the bulk of the volume, has taken place. The second edition was designed to

help a person proposing to explore some wild country, who would know what astronomical and other scientific outfit he ought to take with him, and what observations he might attempt, with a prospect of obtaining valuable results. In the fifth edition one object was to furnish such help as might be possible within the compass of a pocket-book to the explorer who had acquainted himself with the use of instruments, that he might win the more valuable geographical results during his wanderings. Geology and anthropology were added subjects, to which some attention was paid, and some medical and surgical information were introduced from the pen of Surgeon-Major Dobson.

The present editors have not attempted any change in the character of the book, the previous alterations and additions having met with general approval. Capt. Abbey has brought up to date the photography, and the meteorology has been revised by Mr. H. F. Blanford. Mr. J. S. Keltie has something to say on commercial geography.

*Coal and the Coal Mines.* By HOMER GREENE. Boston and New York, Houghton, Mifflin, & Co. 24°. 75 cents.

THIS is one of the Riverside Library for Young People. The object of this series is to furnish books which shall contain reliable information written in language likely to be intelligible and attractive to young people without a descent to "childese." This special number is not so long as to be likely to weary a young person attempting to read it, and it is published at a low price; so that it is the more likely to fall into the hands of those for whom it is intended.

Young folks are not young folks long; and each of us, as he has passed through that stage, has needed, among other things, the books suited to a year, or at most two or three years, then to be thrown aside for others. So in "Coal and the Coal Mines" the publishers have made no attempt to show the capabilities of their art, except in making a book that opens well, and is clearly printed. Every feature is in good taste, but there is no evidence of lavishness in wide margins and heavy calendered paper. It is an attractive and serviceable book for the use it is to have.

We say "it is to have," for we judge that "Coal and the Coal Mines" is sure to have a good many readers, — young readers, and very likely old ones. There is to be found within the covers a straightforward statement of how coal was discovered, how it was found that it could be used to best advantage, and how, when at last it was needed for use in large amounts, ingenuity was set at work to get the coal from the earth.

All this could be told so that little human interest should exist in the telling. But Mr. Greene has lived among the miners; and he carries his reader with the miner down to his hazardous work, letting him know wherein it is hazardous and wherein alluring, and carries him through to the end of a day of profit, or possibly of destruction. Some of the tales he has to tell are intensely exciting, and make one look on a shovelful of coals with a feeling of interest in the human skill and courage that have placed them at our disposal, and wonder whether we are quite justified in throwing them heedlessly on the fire.

Yes, we think those who take up "Coal and the Coal Mines" will finish it, and that they will be the better-informed men or women, boys or girls, for the reading of it.

#### AMONG THE PUBLISHERS.

THE Worthington Company will publish on Nov. 1 "A Study of Ben Jonson," by Algernon Charles Swinburne.

— De Wolfe, Fiske, & Co. have ready "Essentials of the Metric System," by George Jackson, with explanation of its principles, and examples for practice.

— The Writers' Publishing Company, New York, have just issued "A Directory of Catholic Colleges, Academies, and Leading Schools in the United States for 1889 and 1890."

— J. W. Bouton is soliciting subscriptions for the "Salon of Paris" for 1889. Like its predecessors, it will illustrate the principal works by the photogravure process, one hundred plates being promised in various colors, and the majority of them full-page.

—Dodd, Mead, & Co. will publish immediately "The Diary of Philip Hone," edited by Bayard Tuckerman. Philip Hone, an old Knickerbocker, was mayor of New York, and for many years high in the councils of the Whig party, and closely identified with the leading interests of New York City in the early part of this century. His diary extends from 1828 to 1845, and is rich in reminiscences of the political and social life and events of that period. "The Life of John Davis, the Navigator," by Clemens R. Markham, the first of a series of great explorers and explorations, is also nearly ready.

—Charles Scribner's Sons published last week a "History of the United States," by Henry Adams. Mr. Adams's work, when complete, will cover the period embracing the two administrations of Jefferson and the two following of Madison, from 1801 to 1817. The two volumes now ready are devoted to the first administration of Jefferson, and to the political, financial, and international questions that arose after the transfer of the control of the government from the Federalists to the then-called Republican party. The first half-dozen chapters are given over to a review of the economic, social, and intellectual status of the country at the beginning of the century, the domestic and foreign policy of Jefferson's administration being then taken up.

—The sixth edition of the well known "Treatise on Dynamics of a Particle," by Professor Tait and the late Mr. W. J. Steele (New York, Macmillan), has been issued. The work was begun by Professor Tait and Mr. Steele towards the end of 1852, and first appeared in 1856. "At Mr. Steele's early death," says Professor Tait in the preface, "his allotted share of the work was uncompleted, and I had to undertake the final arrangement of the whole. In the subsequent editions it has derived much benefit from revision, first by Mr. Stirling of Trinity in 1865, then by Mr. W. D. Niven of Trinity in 1871, and by Professor Greenhill of Emmanuel in 1878. It last appeared after a general revision by myself, with the assistance of Dr. C. G. Knott and of my colleague, Professor Chrystal. The present edition has been prepared by me, with the assistance of Dr. W. Peddie."

—*Agricultural Science* is about to enter upon the fourth year of its existence. From the beginning it has sought to present to its readers, either as original contributions or in the form of abstracts, that work relating to the sciences underlying and as applied to agriculture, such as would serve as an aid in scientific investigation. Popular writing has never found a place in its pages, for the reason that that field is already occupied by ably edited agricultural journals. Among those contributing original articles during 1889 may be mentioned the following: Dr. H. E. Stockbridge, director Indiana Agricultural Experiment Station; E. S. Goff, professor of horticulture University of Wisconsin; Professor H. H. Harrington, chemist to Texas Agricultural Experiment Station; Dr. H. W. Wiley, chemist to the United States Department of Agriculture; H. L. Bolley, of Purdue University Botanical Laboratory; F. W. A. Woll, of the Wisconsin Agricultural Experiment Station chemical laboratory; Milton Whitney, professor of agriculture in South Carolina University, and vice-director of the experiment station; Dr. E. Lewis Sturtevant, late director of the New York State Agricultural Experiment Station; Dr. W. E. Stone, chemist to the Tennessee Agricultural Experiment Station; Dr. H. P. Armsby, director of Pennsylvania Agricultural Experiment Station; J. B. Harrison, chemist to Government laboratory, Barbadoes, West Indies; and others. C. S. Plumb, of the University of Tennessee, Knoxville, Tenn., the publisher, states that the foreign subscription list has steadily gained from the first, so that at the present time it extends pretty well over Europe, as well as to Japan and the West Indies, while its original contributions are being translated into prominent scientific journals abroad. Consequently, as it also goes into nearly every experiment station in America, it furnishes the best kind of a medium for those persons who wish to submit scientific papers on agriculture to the largest and most appreciative audience. All are invited to do what they can to aid in increasing the effectiveness of this journal, either by subscriptions or publishing in its pages original contributions. Foreign subscribers are also invited to favor the magazine with contributions, which will be printed either in French or German.

—D. G. Brinton, M.D. (2041 Chestnut Street, Philadelphia) announces for publication "Rig Veda Americana," sacred songs of the ancient Mexicans, with a gloss in Nahuatl. The very ancient religious chants, on which the title of the "American Rig Veda" has been bestowed, are preserved in two Nahuatl manuscripts,—one at Madrid, the other at Florence,—both of which the author personally collated. The gloss, found in the former only, is a sixteenth-century commentary on the obscurities of the text. The songs, or chants, are valuable not merely as curious antiquities, but as throwing light on the religious thought and mythology of the native Mexicans, and as illustrating the archaic forms and sacred locutions of their tongue. They are, without doubt, the most ancient authentic examples of American literature and language in existence. The edition will be quite small; the price, \$3, payable on receipt of the volume.

—J. B. Lippincott Company will publish shortly "With Gauge and Swallow," by Judge Tourgée, a new novel which gives free scope to his fondness for socio-political questions.

—To the many other valuable features of "Webster's Dictionary," Messrs. G. & C. Merriam & Co. have added a pronouncing gazetteer of the world, containing over 25,000 titles, and making over 100 pages of new matter, briefly describing the countries, cities, towns, and natural features of every part of the globe, compiled from recent and authentic sources. The aim of this gazetteer is to answer concisely the main questions that may be asked about any of the leading titles in modern geography,— "What is the orthography of the given name?" "What is its correct local pronunciation?" "What are the main features, natural or artificial, of the place itself?" On all these points it has been their object to bring together accurate information in the briefest form.

—"The Journal of Marie Bashkirtseff," a young Russian artist who died in Paris in 1884 at the age of twenty-three, and which has attracted the admiring attention of the foremost critics of Europe, will be published by Messrs. Cassell & Co. about Nov. 11. Among the most enthusiastic in their praise of this journal is the Right Hon. William E. Gladstone, who, in an article in the *Nineteenth Century*, pronounces it "a book without a parallel." The translation has been made by Mrs. Mary J. Serrano. A portrait of Mlle. Bashkirtseff, and reproduction from her paintings now owned by the Luxembourg Gallery, will accompany this edition.

—Fechner's "Elemente der Psychophysik," the volume that formed the starting-point of all discussion and experimentation in the study of the intensity of sensations, and which has long been out of print, has now, after the death of the author, been reprinted under the supervision of Professor Wundt. A valuable index of Fechner's works, and many useful references, are added.

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President American Social Science Association.

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The economic changes that have occurred during the last quarter of a century have unquestionably been more important and varied during any former period of the world's history. The problems which our advancing civilization is forcing upon the attention of society are accordingly of the utmost urgency and importance. To trace out, and exhibit in something like regular order, the causes and extent of the industrial and social changes and accompanying disturbances which have especially characterized the last fifteen or twenty years, and to carefully balance what seems to have been good and what seems to have been evil, have been the main purpose of the author.

D. APPLETON & CO., PUBLISHERS,

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—Harper & Brothers will publish shortly "Cathedrals and Abbeys in Great Britain and Ireland," a large volume containing over forty illustrations. The Rev. Richard Wheatley, D.D., has prepared the descriptive text.

—The *Forum* for November contains the following articles: "American Rights in Behring Sea," by President J. B. Angell of the University of Michigan, which is an historical explanation of the jurisdiction over these waters, and a correction of the erroneous popular supposition concerning it; "Public Opinion and the Civil Service," by E. L. Godkin, editor of the *New York Evening Post*, who describes the puzzling stage in the agitation for reform, both political parties preaching it, and neither heartily practising it (he declares an advance to complete reform or the fatal degradation of the government inevitable, and points out the deep meaning of the agitation); "Modern Claims upon the Pulpit," by the Very Rev. F. W. Farrar, Archdeacon of Westminster, who declares that the two worst pitfalls of the pulpit are theological dogma and speculative discussion, taking very radical ground against dogmatic theology; "The Owners of the United States," by Thomas G. Shearman, the New York statistician (this article we referred to at length in last week's issue); "Industrial Co-operation in England," by Professor F. G. Peabody of Harvard, — a study made in England, of the practical workings of the system, its success, statistics of its growth, and its moral significance, explaining why co-operation has not yet succeeded in the United States; "Municipal Control of Gas-Works," by Bronson C. Keeler of St. Louis, — a comparison of municipal and private control in the principal cities, American and European, and the cost of gas and its price to the consumer in each of these cities; "The Cost of Universities," by President David J. Hill of the University of Rochester, who sets down the wealth, the income, and the expenses (including salaries to professors) of the chief German and American schools, and explains their financial conduct; "Wendell Phillips as an Orator," by Rev. Carlos Martyn of New York, — a critical study; "Requirements of National Defence," by Adjutant-Gen. J. C. Kelton of the United States Army, who shows the inadequacy of the militia of the States, and explains what would constitute a sufficient trained force in case of sudden war, — a military study of our defenceless condition, and the duty of the National Government; "The Domain of Romance," by Maurice Thompson, — a critical article to show that this is the most romantic era of modern times, and that Darwin is the master-mind of the epoch; "Types of American Women," by Professor H. H. Boyesen of Columbia College.

— "A Review of the Family Delphinidæ," with forty-seven plates, by Frederick W. True, curator of the Department of Mammals, United States National Museum, is issued as Bulletin No. 36 of the museum. More than four years ago the writer formed a determination to prepare a monograph of the species of dolphins which occur on the coasts of North America. It immediately became apparent, however, that a proper comparison of the species described respectively by European and American naturalists could not be made without an examination of the types. A large proportion of the species of the family were established by Gray, whose descriptions are for the most part too brief and vague to serve as the basis of critical comparisons, while the descriptions of some other writers on the subject are almost equally insufficient. Such being the condition of the literature, he resolved to visit the museums of Europe, and to examine all the type specimens to which he could gain access. Professor Baird, the late director of the museum, very kindly consented to his being absent during the winter of 1883-84, and he accordingly spent about four months in England and on the continent of Europe in the study of the specimens in question. This bulletin is the result.

—The New York Society of Pedagogy has published through Messrs. Appleton a pamphlet by George B. Newcomb, on "Teaching School Children to Think." The author remarks on the obvious fact that the reasoning-powers of children are exercised in their earliest years, though the higher powers of abstraction are not developed until later. He then goes on to suggest modes by which the power of thought may be cultivated in the child's mind; but we do not find any thing new or striking in what he says. His most useful suggestion is that the teacher should not only present

facts in rational connection, but also take care that they be rationally apprehended by the child. He has a few words in favor of manual training, but what that has to do with cultivating the reasoning-powers we are unable to see. By the way, we should be glad to know from what number of the London *Times* Mr. Newcomb took the quotation given on p. 12.

—November begins the twentieth year of *The Century Magazine*. The opening pages are devoted to a generous instalment of the long-expected autobiography of Joseph Jefferson. The first of the "Present-day Papers" is entitled "The Problems of Modern Society," and it has a preface signed by the group who are putting forth these timely essays. Dr. Langdon writes this paper. The other members of this group are Professor Shields, Bishop Potter, Drs. Munger and Dike, Seth Low, and Professor Ely. George Kennan has a chapter of "Adventures in Eastern Siberia." The history, purposes, and methods of the new "Grolier Club" of New York are fully described by Brander Matthews, and illustrated with drawings of rare Grolier book-covers, etc. Mrs. Foote, in her "Pictures of the Far West," portrays "The Winter Camp." The authors of the Lincoln Life treat of "The Second Inaugural," "Five Forks," and "Appomattox." Mr. Cole's unique engravings of the "Old Masters" are to continue with few intermissions during the coming year. This month he gives two examples of Benozzo Gozzoli. One of the most curious articles which *The Century* has published is entitled "The 'Newness,'" and is by the late Robert Carter, himself an eye-witness of the vagaries of the transcendental movement in New England. There are brief papers on "The Southern Cadets in Action," "Who ever saw a Dead Cavalryman?" "Shooting into Libby Prison," "Prohibition," "American Game Laws," "Copyright Reform," "Free Kindergartens," "Governor Seymour," "The Methodist Church South," etc."

—"Unless we can concentrate legislative leadership, we shall suffer something like national paralysis. We have no one in Congress who stands for the nation, . . . and so management and combination which may be effected in the dark are given the place that should be held by centred and responsible leadership in the focus of the national gaze." This is the keynote of the paper by Mr. Woodrow Wilson, on the "Character of Democracy in the United States," which opens the *Atlantic Monthly* for November. Another political paper, called "The French-in-Canada," is contributed by Mr. Eben Greenough Scott, whose paper on "La Nouvelle France" will be remembered. Artists and amateurs will be interested in "Allston and his Unfinished Picture," — passages from the journals of Mr. Richard H. Dana, — a series of extracts contributed by Mr. Charles Francis Adams about Mr. Allston's last and unfinished picture of "Daniel interpreting to Belshazzar the Writing on the Wall." "Materials for Landscape Art in America," by Charles H. Moore of Harvard University, will also interest the same class of readers. There are also a half-literary, half-historical article on "Some Romances of the Revolution" (a consideration of William Gilmore Simms's novels); a paper on "The Nieces of Mazarin;" and a sketch on "Marie Bashkirtseff," which gives a picture of this impressionable, and in a certain sense typical, "daughter of Gaul."

—In 1878 there was published by Professor J. M. Macoun, of the Geological Survey, Ottawa, Can., a check-list of the plants at that time known to occur in Canada. This list has for some years been out of print; and since it was issued many new species have been discovered, and the names of many more have been changed. At the earnest request of botanists both in Canada and the United States, he has published, and now offers for sale, what he believes to be a complete list of the phænogamous and vascular cryptogamous plants of Canada. The "Catalogue of Canadian Plants," issued by the Geological and Natural History Survey of Canada, has been used as a basis, but a large number of species discovered since it was published are included in the list. Many genera, too, have been revised by specialists, and their revisions have been used in the preparation of the check-list. Where names of species or varieties have been changed, both the name by which a plant is now known and that by which it is called in the catalogue are shown in the list.

— Thomas Whittaker has just published a new edition, with some changes, of Miss Anne Ayres' "Life and Work of William Augustus Muhlenberg."

— Mr. Warren K. Moorehead announces a new work on Ohio Valley earthworks. This work contains 41 full page illustrations made from photographs taken in the field, and a detailed account of exploration in the mounds and graves of Fort Ancient.

— Messrs. Ginn & Co. announce as ready, "Elementary Mathematical Tables," by A. Macfarlane, D.Sc., LL.D., professor of physics in the University of Texas. This collection of tables contains logarithms, antilogarithms, addition logarithms, subtraction logarithms, logarithmic sines and cosines, logarithmic tangents and cotangents, natural sines and cosines, natural tangents and cotangents, natural secants and cosecants, arcs, reciprocals, squares, cubes, square roots, cube roots, circumferences, circular areas, spherical contents, powers, constants, hyperbolic logarithms, exponentials, divisors, least divisors, interest tables, first nine multiples of numbers up to 1000, with a large number of auxiliary tables. The tables are mostly four-place: they have a uniform decimal arrangement similar to that of seven-place logarithmic tables; they are mostly synoptic, are provided with differences and proportional parts, and are arranged so that the function may be read off for any position of the decimal point in the argument. The tables are designed to be useful not only in computing and in the graphic method, but also in the teaching of arithmetic and in the illustration of the theorems of algebra.

— Mr. Gordon L. Ford of Brooklyn has in press a number of interesting unpublished agreements between Washington and his overseers and workmen, throwing much light upon the management of his estates, as well as on the "labor question" of colonial Virginia. The agreements are copied from the originals in Washington's writing, and all date before the Revolution. In this volume will also be included a correspondence that Washington had in 1774 with a number of merchants and others, concerning a scheme he entertained of importing German Palatines to settle upon his western lands, and one of Washington's advertisements for runaway servants. Very little of this material has been published heretofore, and "Washington as an Employer and Importer of Labor" will present a new phase of his character. The edition will be limited to five hundred copies.

— M. Rénan is at work on the fourth volume of his "History of Israel." He is also correcting, says the New York *Tribune*, the proof-sheets of a new book to be entitled "The Future of Science." It is an essay entirely written as long ago as 1848, and deals, among other topics, with the theory of development subsequently enunciated by Darwin. In various other matters M. Rénan is shown to have anticipated subsequent discoveries in the fields of knowledge, and to have indicated the general direction to which science was tending. He has neither added to nor excised a single passage from his earlier essay, the only alterations introduced being those of style.

#### LETTERS TO THE EDITOR.

\*.\*Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

The editor will be glad to publish any queries consonant with the character of the journal.

On request, twenty copies of the number containing his communication will be furnished free to any correspondent.

#### Electric Eccentricities.

DURING the great fire that raged over northern Wisconsin in 1871, and which wiped out not only the prosperous village of Pestigo, but, in the aggregate of farmhouses, half a dozen villages like Pestigo, there were many evidences of electrical phenomena present. The flames were seen to possess that sudden rapidity of action which only electricity can impart. They would leap over wide spaces with the greatest rapidity, leaving many objects in the rear that one would suppose could not escape, and striking others beyond, and least exposed, in the most unaccountable manner. The details of that great disaster would disclose many curious and

instructive facts. People were found dead without any apparent injury, though lying out in the open fields, and far from the burnt woods. Of course, it is popularly supposed that these suffocated in the superheated atmosphere. However that may be, one circumstance coming under my own observation proves conclusively the presence of electricity, and a very curious action of the subtle fluid, too. Shortly after the fire, the editor of the Green Bay *Advocate* exhibited a copper coin taken from the pocket of one of the victims found dead in the middle of a large clearing. The coin was fused, but no sign of injury whatever was discovered on the man's person.

GEO. GIBSON.

Hudson, Wis., Oct. 22.

[Is it not possible that the coin was fused before it went into the unfortunate man's pocket? — E.D.]

#### A Lightning Discharge in Quebec.

As you request observations of lightning, I take occasion to send you some made by myself. On the 29th of June, 1887, a violent thunder-storm broke over Quebec about six o'clock in the evening. The wind was blowing from the west. At Levis, opposite Quebec, a church was being built at that time, and the wood-work of the tower had just been finished. The roof was finished, and it was covered with galvanized iron. This sheathing was connected by lightning-rods with the earth. The first fall of rain wet the west portion of the tower; and, in an instant after, the lightning struck the tower, leaving intact the east portion, but shattering completely all those parts of the wood rendered semi-conducting by the rain. After reaching the metallic covering of the roof, the electricity was probably conducted by the rods to the earth, as no further trace of it could be found. The great beams of the wood-work had been broken by the discharge, and the wood in great part splintered. The annual rings had separated one from another without any trace of carbonization.

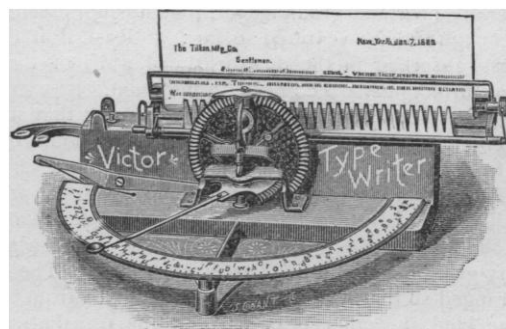
J. C. K. LAFLAMME.

Quebec, Oct. 20.

#### INDUSTRIAL NOTES.

##### The Victor Type-Writer.

A FEW years ago there was only one type-writer on the market; but such has been the activity of inventors, that there are now a score or more to be had, so that the most varied tastes in type-writers may easily be satisfied. The older and better-known key machines, familiar in all business-offices, still maintain their leader-



ship, though they are closely followed by machines of more recent invention. The most recent of these key type-writers was described in these columns a few weeks ago.

In some of the key-board machines there is a key for each character, as the Caligraph, the Yost, and the Automatic. In others a shifting or changing device gives two or three characters for each key, as the Remington, the Hammond, and others. The keys on these machines, therefore, range in number from thirty to eighty or more.

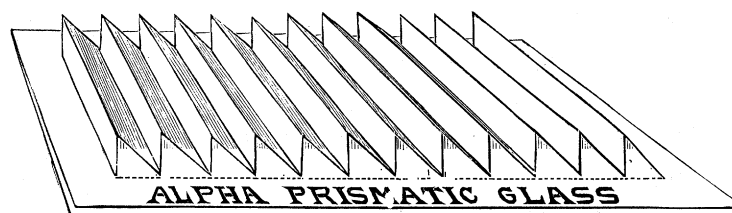
There is another class of type-writers in the market, without a key-board, in which the character to be printed is first sought out

on an index, and the impression is made either by pressing down the pointer when in the proper position, or by moving with the left hand some device which presses the type against the paper. Of this latter variety of the "lever" or single-key class of machines, the Victor type-writer, shown in the illustration, is a good example. The characters, eighty in number, are arranged in three rows on the semi-circular index-plate in front, over which the pointer is moved by the right hand until the desired character is reached. This movement of the pointer is transmitted by gearing to the vertical type-wheel in the centre. The types, which are carried on the ends of radial springs at the periphery of the wheel, are moved around so that when the pointer is over *a*, for instance, on the index, the type *a* is at the printing point. The impression is then produced by pressing with the left hand the finger-piece shown at the left of the engraving. The paper is carried between two rollers on a sliding carriage, which travels behind the type-wheel, moving the proper distance automatically after each impression.

The Victor, though a very cheap machine, prints capitals and small letters, figures and fractions, and punctuation-marks, is simple in construction, small and light, and, for so cheap a machine, prints rapidly and well. This type-writer is one of the interesting exhibits at the American Institute Fair in this city.

#### Light in Dark Places.

THERE is many a room down in the depths of a city building — for we may measure such buildings in depth from the roof, which is the only part on which sunlight strikes, rather than in height from the sidewalk — where it would be a relief to suffering humanity if an occasional ray of sunlight could be induced to enter. To



say nothing of the basement offices in some of the down-town buildings of New York, let one consider the condition as to light of the average city flat. There is a room in front with windows on the street, and there is a room in the rear with windows on the yard. There are rooms between these extremes with windows, to be sure, but to what purpose is a mystery. These windows open on air-shafts not more than three or four feet wide, and shafts so deep, if you are near the ground floor, that no light seems quite energetic enough to have ventured so far: at least, if it does go down, it rests absorbed in the dust-begrimed walls of the shaft, incapable of turning a sharp corner into the room.

It is now possible to see in this city an experiment that shows it to be perfectly feasible to help a most remarkable amount of these stray rays from the bottom of a black air-shaft into a window at its side. This is done by placing in the window panes of prismatic glass like that we illustrate. The effect is, that a newspaper may be read at the farther side of the room, whereas, with a window of the ordinary glass, reading in any part is impossible. The experiment is arranged so that, when a shutter is removed from the window of one kind, the other is closed, and the transformation is striking.

#### New Electric Railways.

DURING the past few weeks the Thomson-Houston Electric Company of Boston has completed the electrical equipment of a number of street-railways, on which the electric cars are now in daily operation. Among them are the following: Central Railway, Peoria, Ill.; Citizens' Electrical Street Railway, Decatur, Ill.; Metropolitan Street Railway, Kansas City, Mo.; Omaha Motor Railway, Omaha, Neb.; Ottumwa Street Railway, Ottumwa, Ill.; Quincy Street Railway, Quincy, Mass.; Richmond Street Railway, Richmond, Ind. The total number of cars in use on these roads is 63; and

the number of miles operated, about 44. The company has also closed the following important contracts: Albany City Railway, Albany, N.Y.; City Electric Street Railway, Nashville, Tenn.; Kearney Street Railway Company, Kearney, Neb.; Macon City & Suburban Railway Company, Macon, Ga.; Metropolitan Street Railway, Toronto, Ont.; St. Paul City Railway Company, St. Paul, Minn.; St. Paul & Minneapolis Railway, St. Paul, Minn.; Union Depot Railway, St. Louis, Mo. The number of cars in use on these roads is 116; and the number of miles operated, about 114. This gives a grand total of 179 cars, running or contracted for, and 158 miles of track.

A contract has been recently closed for an electric railway at San José, Cal., which is the first Thomson-Houston road in the State. As one electric railway has already failed in this city, the selection of another was not made without careful investigation, which resulted in making the contract with the Thomson-Houston Electric Company. Ornamental double-bracket iron poles will be used, and nothing will be left undone in making the road a model in every respect.

#### The Julien Electric Traction Company.

IN view of the recent decision of Judge Lacombe, assigning to the Julien Electric Traction Company a definite and specific process of making its storage-batteries as distinguished from other methods, this company have concluded to temporarily suspend the operation of their cars in this city, pending the manufacture of batteries according to the method prescribed by the court. The factory at Camden, they state in a circular to their stockholders, will expedite the manufacture of batteries so as to enable them within a few

weeks to resume operations. In the circular they say, "It is gratifying to know that the court has finally determined the respective rights of this company and the complainants as to the methods to be employed by each in making batteries, more especially as the method we shall now employ is not only practical, but, in the opinion of such competent experts as Professor Cross of the Institute of Technology, Professor Brackett of Princeton College, and Professor Edward Weston of Newark, is superior to the method awarded to the complainant."

The company further state that they find in *L'Ingenieur Conseil* of Oct. 12, just received from abroad, the following information in relation to the granting of prizes at the Universal Exposition at Paris for the different types of accumulators or storage-batteries, which is translated as follows: "The official list of prizes distributed to exhibitors has just been published. We give herewith the award of merit which the jury has assigned to the different manufacturers of accumulators: grand prize, M. Gaston Planté (deceased); gold medal, The Société l'Électrique of Brussels, who manufacture the Julien accumulators; silver medals, The Electric Power Storage Company of London, which exploits the Faure-Sellon-Volckmar accumulators; silver medal, to the French Société of Accumulators (Phillipart Brothers), who exploit in France the Faure-Sellon-Volckmar accumulators. Silver medals were also awarded to M. Gadot, who also exploits the Faure-Sellon-Volckmar accumulators in France; and to M. Emile Regnier, who exploits accumulators of his own system. The other manufacturers of accumulators obtained either bronze medals or honorable mention. When we consider that the grand prize was given to M. Planté purely as an honor to the memory of a *savant* who in 1859 invented the secondary pile, the highest distinction was in reality granted to L'Électrique (or Julien) in this important branch of electricity."